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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/042,590	01/09/2002	Michael Renne Ty Tan	10010679-1	6631
57299	7590	12/04/2008		
Kathy Manke Avago Technologies Limited 4380 Ziegler Road Fort Collins, CO 80525			EXAMINER VY, HUNG T	
			ART UNIT 2163	PAPER NUMBER
			NOTIFICATION DATE 12/04/2008	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/042,590	Applicant(s) TAN ET AL.	
	Examiner HUNG T. VY	Art Unit 2163	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 14-16 and 18-21 is/are rejected.
- 7) ☒ Claim(s) 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. As of entry of the Applicant's response filed on 09/22/2003 and Petition Decision on 03/29/2007, claims 1-31 are pending in this application as result of withdrawn claims 8-13 and 22-31 for non-elected claims.

Summary of claims

2. Claims 1-31 are pending.

Claims 1-7 and 14-16 and 18-21 are rejected.

Claims 8-13 and 22-31 are withdrawn.

Claim 17 is objected.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

a. Claims 1, 3 and 5-6 are rejected under 35 U. S. C. § 102 (b) as being anticipated by Nunoue et al. (U.S. pat. 6,720,583).

Regarding claim 1, Nunoue et al. discloses a distributed Bragg reflector (DBR) comprising:

a plurality of first material layers (16) formed from a first material over a substrate (12) and separated by a corresponding plurality of gaps (20) (fig. 12);

an additional layer (18)(fig. 12) or (s)(fig. 4), where the additional layer supports the plurality of first material layers (18)(fig. 12) or (M) (fig. 4) at their periphery (fig. 4).

Regarding claim 3, Nunoue et al. discloses the gap is filled with air (col. 5, line 55-58).

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Regarding claim 5, Nunoue et al. discloses wherein the additional layer (S) is a regrowth of the first material (M) (fig. 9).

Regarding claim 6, Nunoue et al. discloses wherein the first material is a semiconductor (i.e., “AlGaIn” (col. 5, line 57)).

Claim Rejections - 35 U.S.C. § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

b. Claims 2, 4, 7 is rejected under 35 U.S.C. 103 (a) as being unpatentable over

Nunoue et al. (U.S. pat. 6,720,583) in view of Streubel et al. at other publications section on page 1 of U.S. Pat. 6,720,583

Regarding claims 2 and 4, 7, Nunoue et al. discloses all limitations of claimed invention recited in claim 1 except wherein the first material is InP. However, Streubel et al. at page 1 (Other Publications section) of U.S. 6,720,583 discloses wherein the first material is InP (Fabrication of InP/air-gap Distributed Bragg Reflector and Micro-cavities”¹). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify Nunoue et al.'s device to have different kind of material such as InP in order to have desired reflectivity of the DBR since the characteristic of the semiconductor material InP. Further, It would have been obvious to one having ordinary skill in the art at the time the invention was made to have different semiconductor material such as **InP, dielectric, etc.** since it is not new and it has been held to be within the general skill of a worker in the art to select a known

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material on the basis of its suitability for the intended use as a matter of obvious design choice.

In re Leshin, 125 USPQ 416.

c. Claims 14, 17, 19, 21 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Nunoue et al. (U.S. pat. 6,720,583) in view Sirbu et al. (U.S. pub. 2002/0131464)

Regarding claim 14, Nunoue et al. discloses a vertical-cavity surface-emitting laser (VCSEL) (col. 11, line 56), comprising:

a substrate (12)(fig. 12) (112) (fig. 14);

a distributed Bragg Reflector (16)(fig. 12) (117)(fig. 14) formed over the substrate (12) (fig. 12) 112 (fig. 14) and including a plurality of semiconductor material layers (i.e., “Al_{0.05}Ga_{0.95}N” (col. 11, line 59) separated by air gaps (20)(fig. 12).

an active region (30) (fig. 12) formed over the DBR (16), the active region including a current confinement region (26) (fig. 12) ;

second DBR (ML) (fig. 12) formed over the active region (30)(fig. 12)

electrical (50,60) contacts associated with the active region (30) and the DBR (ML)(FIG. 12)

where the DBR reflector (M) includes a support layer (S) to support the layer of semiconductor layer (M)(fig. 5, 9).

but Nunoue et al. does not explicitly disclose a tunnel junction. However, Sirbu et al. discloses the tunnel junction (0026). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify Nunoue et al.'s device to have a

¹ Materials Science and Engineering, B44, 1997, pp. 364-367

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junction channel in order to insulate barrier between two conducting electrodes for create the strong current and prevent the lead current for state purpose as teaching of Sirbu et al. (0008).

Regarding claim 17, Nunoue et al. discloses wherein an additional semiconductor material layer (32) formed between the active region (30) and the second reflector (ML)(fig. 12)

Regarding claim 19, Nunoue et al. discloses wherein the second reflector (ML) is an air gap (44) supported DBR (fig. 12).

Regarding claim 21, Nunoue et al. discloses wherein the additional layer (S) is a regrowth of the first material (M) (fig. 9).

d. Claims 15-16, 20 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Nunoue et al. (U.S. pat. 6,720,583) in view Sirbu et al. (U.S. pub. 2002/0131464) and further in view of Streubel et al. at other publications section on page 1 of U.S. Pat. 6,720,583

Regarding claims 15 -16, 20, Nunoue et al. and Sirbu et al. disclose all limitations of claimed invention recited in claim 14 except wherein the first material is InP. However, Streubel et al. at page 1 (Other Publications section) of U.S. 6,720,583 discloses wherein the first material is InP (Fabrication of InP/air-gap Distributed Bragg Reflector and Micro-cavities”². It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify Nunoue et al. and Sirbu et al's device to have different kind of material such as InP in order to have desired reflectively of the DBR since the characteristic of the semiconductor material InP. Further, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have different semiconductor material such as **InP, dielectric,**

² Materials Science and Engineering, B44, 1997, pp. 364-367

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etc. since it is not new and it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Allowable Subject Matter

5. Claim 18 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, since the prior art of record and considered pertinent to the applicant's disclosure does not teach or suggest the claimed a conductive layer located between the air gap and the second reflector, and an additional set of electrical contacts associated with the conductive layer, the additional set of electrical contacts configured to receive an electrical signal and alter the light output wavelength of the VCSEL by causing the conductive layer to move in response to the electrical signal resulting in a tunable VCSEL.

Conclusion

6. When responding to the office action, Applicants are advised to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hung Vy whose telephone number is (571) 272-1954. The examiner can normally be reached on Monday-Friday 8:30 am - 5:30pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Wong can be reached on (571) 272-1834. The fax numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications.

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Information regarding the status of an application may be obtained from the patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either private Pair or Public Pair. Status information for unpublished applications is available through Private Pair only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have question on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Hung T Vy/

Primary Examiner, Art Unit 2163

December 04,2008